3.5 PANTEX PLANT

Pantex is located in the Texas Panhandle in Carson County along U.S. Highway 60 and lies about 27 km (17 mi) northeast of downtown Amarillo. Figure 2.2.4–1 indicates the location of Pantex, and Figure 2.2.4–2 shows the location of primary facilities and industrial zones within the site's boundary.

Pantex lies on the Llano Estacado (staked plains) portion of the Great Plains. The topography at Pantex is relatively flat, characterized by rolling grassy plains and numerous natural playa basins. The term "playa" is used to describe the more than 17,000 ephemeral lakes in the Texas Panhandle, usually less than 1 km (0.6 mi) in diameter, that receive water runoff from the surrounding area. The region is a semiarid farming and ranching area. Pantex is surrounded by agricultural land, but several significant industrial facilities are also located nearby.

Pantex is Government-owned and contractor-operated. The Mason & Hanger-Silas Mason Company has been the operating contractor since 1956. Since 1991, the environmental, health, and safety programs have been subcontracted to Battelle Memorial Institute.

Pantex was first used by the U.S. Army for loading conventional ammunition shells and bombs from 1942 to 1945. In 1951, the AEC arranged to begin rehabilitating portions of the original plant and constructing new facilities for nuclear weapons operations. The current missions are shown in Table 3.5–1. Weapons assembly, disassembly, and stockpile surveillance activities involve handling (but not processing) of encapsulated uranium, Pu, and tritium, as well as a variety of nonradioactive hazardous or toxic chemicals. Environmental restoration of the facility is a recent addition to operations at the plant.

Table 3.5–1. Current Missions at Pantex Plant

Mission	Description	Sponsor
Plutonium Storage	Provide storage of pits from dismantled nuclear weapons	Assistant Secretary for Defense Programs
High Explosive(s) Components	Manufacture for use in nuclear weapons	Assistant Secretary for Defense Programs
Weapon Assembly	Assemble new nuclear weapons for the stockpile	Assistant Secretary for Defense Programs
Weapon Maintenance	Retrofit, maintain, and repair stockpile weapons	Assistant Secretary for Defense Programs
Quality Assurance	Stockpile quality assurance testing and evaluation	Assistant Secretary for Defense Programs
Weapon Disassembly	Disassemble stockpile weapons as required	Assistant Secretary for Defense Programs
Test/Training Programs	Assemble nuclear weapon-like devices for training	Assistant Secretary for Defense Programs
Weapons Dismantlement	Dismantle nuclear weapons no longer required	Assistant Secretary for Defense Programs
Development Support	Provide support to design agencies as requested	Assistant Secretary for Defense Programs
Environmental Management	Environmental Restoration and Waste Management Activities	Assistant Secretary for Environmental Management

Source: PX 1995a:2

Department of Energy Activities. All DOE activities at Pantex, except for environmental restoration and some waste management programs, fall under the DOE Office of the Assistant Secretary for Defense Programs (DP). Historically, DOE's national security mission for Pantex primarily included assembly and delivery to DoD of a variety of nuclear weapons. Today, the primary role of Pantex is the disassembly of U.S. nuclear weapons being returned to DOE by DoD. This operation is in compliance with the negotiated downsizing of the United States and the former Soviet nuclear forces. Disassembly of a nuclear weapon includes removal of the fissile material. Subsequent storage of pits is the mission of major relevance to this PEIS.

Other activities that have been, and will continue to be, conducted under DOE's national security mission include certain maintenance and monitoring activities of the remaining nuclear weapons stockpile, modification and assembly of existing nuclear weapons systems, and production of HE components for nuclear weapons. DOE also conducts quality evaluation of weapons, quality assurance testing of weapons components, and R&D activities supporting nuclear weapons at the plant. DOE's responsibilities are mandated by statutes, Presidential directives, and congressional authorization and appropriations.

Waste management operations at Pantex in the near term (1996 to 1997) would add facilities to enhance capabilities to adequately handle existing waste streams. Improved facilities for hazardous waste staging, treatment, and storage would be coupled with increased use of commercial offsite facilities to treat mixed waste streams. The change in mission emphasis from assembly to disassembly of nuclear weapons would cause an increase in some waste streams and a decrease in others. New waste-handling capacities would be required to meet this need, but upon completion of the current backlog of dismantlements due to stockpile reduction, waste generation would decrease.

Non-Department of Energy Activities. Texas Tech University pursues agricultural activities on both DOE-owned and DOE-leased property.

3.5.1 LAND RESOURCES

Land Use. Pantex is located within Carson County in the Panhandle region of Texas, 27 km (17 mi) east-northeast of downtown Amarillo. Pantex operational activities are situated within 6,030 ha (14,900 acres) of land, of which approximately 3,683 ha (9,100 acres) are owned by the Federal Government and the remaining 2,347 ha (5,800 acres) are leased from Texas Tech University primarily to provide a safety and security buffer zone. All owned and leased buildings on the site are administered, managed, and controlled by DOE. DOE owns an additional remote tract of 436 ha (1,077 acres) of undeveloped land at Pantex Lake located approximately 4 km (2.5 mi) northeast of the main plant site. This property is held by DOE to retain the water rights. Total Pantex area equals 6,466 ha (15,977 acres).

Existing Land Use. Generalized land uses at Pantex and the vicinity are shown on Figure 3.5.1–1. The Texas Tech Agriculture Research operations use DOE-owned land not actively used for Pantex operations, as well as the property leased to DOE for agricultural purposes. Agricultural activities generally consist of dry farming and livestock grazing. A limited amount of crop irrigation occurs. Soil map units classified as prime farmland soils by the U.S. Department of Agriculture, National Resources Conservation Service exist onsite. However, the potential for farmland conversion by activities at Pantex is not an issue since Pantex is exempt from compliance with the *Farmland Protection Policy Act* (PX DOE 1995a:1). Land area leased from Texas Tech also contains one residence and one trailer located approximately 6 km (3.7 mi) southwest of the weapons assembly and disassembly and HE production core (PX DOE 1996b:4-94).

The land surrounding Pantex is rural private property. The closest offsite residences are approximately 48 m (157 ft) from the plant boundary in the western and northeastern sectors. Most of the surrounding land is prime farmland when irrigated, with the exception of the area northwest of the plant site, which is rangeland. Some property owners have enrolled their land in the Federal Conservation Reserve Program. Under terms of the program, the land is placed in a dormant state for 10 years and cannot be cultivated or grazed. The majority of the land, however, is cultivated. The land is generally dry farmed; however, some fields are irrigated from local playas or from the Ogallala Aquifer. The Iowa Beef Packers, Inc., packing plant is the only industrial activity within 3.2 km (2.0 mi) of Pantex.

Land-Use Planning. Within the State of Texas, land-use planning occurs only at the municipal level. The city of Amarillo comprehensive plan has designated land for future growth. The direction for future residential development is anticipated to occur toward the southwest, away from Pantex. The East Planning Area of the city, which extends to within 3.2 km (2 mi) of Pantex, has historically been one of the slower growing residential areas. Because of the presence of the airport and industrial use in this area, the comprehensive plan encourages compatible use rather than residential use. The largest residential area in the East Planning Area is the base housing of the former Amarillo Air Force Base. The base housing has been converted to rental housing and is located approximately 8 km (5 mi) southwest of the plant boundary.

Visual Resources. Pantex is sited within a landscape typical of the High Plains region of Texas consisting of cultivated cropland and rangeland. Pantex consists of operational facilities of the plant and the inactive facilities of the former World War II ammunition plant. These industrial land uses are surrounded by cropland and rangeland that blend into the offsite viewscape. The developed areas of Pantex are consistent with VRM Class 5 designation. The remainder of Pantex ranges from VRM Class 3 to Class 4.

Public access within Pantex and its buffer areas is strictly controlled and limited to authorized personnel, visitors, and the agricultural lessee and sublessees. Public access adjacent to the plant perimeter is limited to three Texas Farm-to-Market Roads and U.S. Route 60. The most visible, and therefore most sensitive, viewpoint of Pantex facilities is located 2.4 km (1.5 mi) southeast at the intersection of U.S. Route 60 and Texas Farm-to-Market Road 2373. U.S. Route 60 is part of the Texas Plains Trail, a scenic road with Pantex a designated point of interest. The view of the plant along this highway is visible, appearing as low clusters of buildings on a flat horizon. Because of their height, the cylindrical water towers are the most visible feature. The operations areas are well defined at night by the intense security lighting. The plant operations areas are also visible from Interstate 40, with the closest viewpoint being the rest area approximately 10 km (6 mi) away. This viewpoint is similar to that described for U.S. Route 60, but because of the greater distance, the plant facilities are not as prominent. The plant facilities are generally visible from the low-density rural housing that surrounds the site.

3.5.2 SITE INFRASTRUCTURE

Baseline Characteristics. Section 3.5 describes current Pantex missions. Baseline characteristics are shown in Table 3.5.2–1.

Table 3.5.2–1. Pantex Plant Baseline Characteristics

Characteristics	Current Usage	Site Availability
Transportation		
Roads (km)	76	76
Railroads (km)	27	27
Electrical		
Energy consumption (MWh/yr)	84,420	201,480
Peak load (MWe)	13.6	23
Fuel		
Natural gas (m^3/yr)	14,600,000	289,000,000
Oil (l/yr)	1,775,720	1,775,720
Coal (t/yr)	0	0
Steam (kg/hr)	59,524	68,040

Source: PX 1995a:1; PX DOE 1995d; PX DOE 1996b.

Pantex is tied to the Burlington Northern Santa Fe Railroad, formerly known as the Atchison, Topeka, and Santa Fe Railroad, through a spur that enters the plant from the southwest running just north of U.S. Highway 60. This spur provides access to the entire Burlington Northern Santa Fe system as well as to other railroads. Currently, the spur is being used only for concrete shipments.

Electric generating capacities by fuel types within the sub-regional power pool supplying power to Pantex provide the larger fractions by coal, oil, and gas turbine production, respectively. The remaining is provided by small amounts of nuclear, hydroelectric, and other sources. The sub-regional electric power pool from which Pantex draws its power is the West Central Power Pool. The sub-regional power pool electrical summary is shown in Table 3.5.2–2.

Natural gas at Pantex is supplied by Anthem Energy. From calendar year 1987 through fiscal year 1994, gas use has generally increased from a low of 11,889 million m^3 (424,605 million ft^3) in 1988 to a high of 15,033 million m^3 (536,893 million ft^3) in 1993. Both current and future supplies appear to be adequate. Much of the region is underlain by natural gas deposits, and there are consequently many small local suppliers in addition to the major companies.

Five wells, which are pumped into a common line and into ground storage tanks, supply water to Pantex. There are a total of 24.2 million l (6.4 million gal) of ground storage capacity. Two elevated storage tanks totaling 1,374,000 l (363,000 gal) provide pressure to the system. Water use at Pantex has ranged from 1,052 to 1,192 million l (278 to 315 million gal) annually from 1989 through 1993. In addition, water sold to Texas Tech University ranged from 235 to 344 million l (62 to 91 million gal) annually during the same period.

Operations at Pantex are housed in 476 buildings, containing 230,200 m^2 (2,483,000 ft^2) of work space. Magazines in Zone 4 consist of 95 buildings used for staging nuclear weapons, storage of explosives, and interim storage of pits. Current pit storage capability consists of 22 Modified Richmond and Steel Arch Construction magazines, all of which have necessary utility support and material access control. Current capacity for pit storage is 20,000 pits.

Table 3.5.2–2. West Central Sub-Regional Power Pool Electrical Summary

Characteristics	Energy Production
Type Fuel[a]	
Coal	59%
Nuclear	7%
Hydro/geothermal	1%
Oil/gas	32%
Other[b]	1%
Total Annual Production	107,607,000 MWh
Total Annual Load	104,681,000 MWh
Energy Exported Annually[c]	2,926,000 MWh
Generating Capacity	24,642 MWe
Peak Demand	20,578 MWe
Capacity Margin[d]	4,064 MWh

[a] Percentages do not total 100 percent due to rounding.
[b] Includes power from both utility and non-utility sources.
[c] Energy exported is not the difference of production and load due to negative net pumped storage.
[d] Capacity margin is the amount of generating capacity available to provide for scheduled maintenance, emergency outages, system operating requirements, and unforeseen electrical demand.
Source: NERC 1993a.

3.5.3 AIR QUALITY AND NOISE

Meteorology and Climatology. The climate at Pantex and in the surrounding region is characterized as semi-arid with hot summers and relatively cold winters. The average annual temperature in the Amarillo region is 13.8 °C (56.9 °F); temperatures range from an average daily minimum of -5.7 °C (21.8 °F) in January to an average daily maximum of 32.8 °C (91.1 °F) in July. The average annual precipitation is 49.7 cm (19.6 in). Prevailing wind directions at Pantex are from the south to southwest. The average annual windspeed is 6.0 m/s (13.5 mph) (NOAA 1994c:3). Additional information related to meteorology and climatology at Pantex is presented in Appendix F.

Ambient Air Quality. Pantex is located within the Amarillo-Lubbock Intrastate AQCR (#211), which is currently designated as "attainment" or "unclassified" by EPA (40 CFR 81.344) with respect to the NAAQS for criteria pollutants (40 CFR 50). Appendix F lists the NAAQS for these criteria pollutants. These standards have been adopted by the State of Texas (TX NRCC 1995b:28). There are no PSD Class I areas within 100 km (62 mi) of Pantex.

Historically, the primary emission sources of criteria pollutants at Pantex are the steam plant boilers, the explosives burning operation, and emissions from onsite vehicles (PX DOE 1983a:3-8,3-11). Potential emission sources of hazardous/toxic air pollutants include the high explosives synthesis facility, the explosives burning operation and paint spray booths, miscellaneous laboratories, and other small operations. With the exception of thermal treatment of HE at the Burning Ground, most stationary points of nonradioactive atmospheric releases are from fume hoods and building exhaust systems with HEPA filters.

Table 3.5.3–1 presents the baseline ambient air concentration for criteria pollutants and other pollutants of concern at Pantex. As shown in the table, baseline concentrations are in compliance with applicable guidelines and regulations.

Noise. Major noise emission sources within Pantex include various industrial facilities, equipment, and machines (for example, cooling systems, transformers, engines, pumps, boilers, steam vents, construction and materials handling equipment, vehicles, weapons firing, alarms, and explosives detonation). Most Pantex industrial facilities are at a sufficient distance from the site boundary to make noise levels at the boundary from these sources barely distinguishable from background noise. However, some noise from explosives detonation can be heard at residences north of the site and weapons firing can be heard at residences west of the site.

The acoustic environment along the Pantex boundary and at nearby residences away from traffic noise is typical of a rural location, with DNL in the range of 35 to 50 dBA (EPA 1974a:B-4). Noise survey results in areas adjacent to Pantex indicate that ambient sound levels are generally low, with natural sounds and distant traffic being the primary sources. Traffic, aircraft, trains, and agricultural activities result in higher short-term levels especially near roads (PX DOE 1995i:11-1,11-23). Traffic is the primary source of noise at the site boundary and at residences located near roads. Plant traffic contributes little to overall traffic noise. However, traffic noise is expected to dominate sound levels along major roads in the area, such as U.S. Route 60. The residents that have the highest potential for being affected by noise from plant traffic along Pantex access routes are those living along Farm-to-Market Roads 2373 and 683.

Other sources of noise include aircraft, wind, insect activity, and agricultural activity. Except for the prohibition of nuisance noise, neither the State of Texas nor its local governments have established any regulations that specify acceptable community noise levels.

Table 3.5.3–1. Comparison of Baseline Ambient Air Concentrations With Most Stringent Applicable Regulations or Guidelines at Pantex Plant, 1993

Pollutant	Averaging Time	Most Stringent Regulation or Guideline[a] ($\mu g/m^3$)	Baseline Concentration ($\mu g/m^3$)
Criteria Pollutants			
Carbon monoxide	8-hour	10,000[b]	161
	1-hour	40,000[b]	924
Lead	Calendar Quarter	1.5[b]	0.01
Nitrogen dioxide	Annual	100[b]	0.90
Ozone	1-hour	235[b]	[c]
Particulate matter less than or equal to 10 microns in diameter	Annual	50[b]	8.73
	24-hour	150[b]	88.5
Sulfur dioxide	Annual	80[b]	<0.01
	24-hour	365[b]	<0.01
	3-hour	1,300[b]	<0.01
	30-minute	1,045[d]	<0.01
Mandated by the State of Texas			
Hydrogen fluoride	30-day	0.8[d]	<0.27
	7-day	1.6[d]	<0.27
	24-hour	2.9[d]	0.27
	12-hour	3.7[d]	0.38
	3-hour	4.9[d]	1.52
Hydrogen sulfide	30-minute	111[d]	[e]
Sulfuric acid	24-hour	15[d]	[e]
	1-hour	50[d]	[e]
Total suspended particulates	3-hour	200[d]	[e]
	1-hour	400[d]	[e]
Hazardous and Other Toxic Compounds			
1,1,1-Chloroethane	30-minute[f]	500[d]	127
	Annual	50[d]	0.53
1,1,2-Trichloroethane	30-minute[f]	550[d]	17.3
	Annual	55[d]	0.08
2-Nitropropane	30-minute[f]	50[d]	8.55
	Annual	5[d]	0.04
Alcohols	30-minute[f]	[g]	195
	Annual	[g]	0.70
Benzene	30-minute[f]	30[d]	19.40
	Annual	3[d]	0.05
Carbon disulfide	30-minute[f]	30[d]	22.60
	Annual	3[d]	0.09
Carbon tetrachloride	30-minute[f]	126[d]	19.7
	Annual	13[d]	0.08
Chlorobenzene	30-minute[f]	460[d]	19.5
	Annual	46[d]	0.08

Table 3.5.3–1. Comparison of Baseline Ambient Air Concentrations With Most Stringent Applicable Regulations or Guidelines at Pantex Plant, 1993—Continued

Pollutant	Averaging Time	Most Stringent Regulation or Guideline[a] (μg/m³)	Baseline Concentration (μg/m³)
Hazardous and Other Toxic Compounds (continued)			
Chromium	30-minute[f]	1[d]	0.10
	Annual	0.1[d]	0.002
Cresol	30-minute[f]	5[d]	0.41
	Annual	[h]	0.002
Cresylic acid	30-minutef	5[d]	0.51
	Annual	[h]	0.002
Dibenzofuran	30-minute[f]	[h]	0.001
	Annual	[h]	0.00002
Ester glycol ethers	30-minute[f]	[h]	35.9
	Annual	[h]	0.15
Ethyl benzene	30-minute[f]	2,000[d]	31.1
	Annual	434[d]	0.13
Ethylene dichloride	30-minute[f]	40[d]	9.58
	Annual	4[d]	0.04
Formaldehyde	30-minute[f]	15[d]	0.37
	Annual	1.5[d]	0.004
Hydrogen chloride	30-minute[f]	75[d]	5.98
	Annual	0.1[d]	0.09
Ketones	30-minute[f]	[h]	33.4
	Annual	[h]	0.14
Mercury	30-minute[f]	0.5[d]	0
	Annual	0.05[d]	0
Methanol	30-minute[f]	2,620[d]	245
	Annual	262[d]	0.58
[Text deleted.]			
Methyl ethyl ketone	30-minute[f]	3,900[d]	1,400
	Annual	590[d]	5.10
Methylene chloride	30-minute[f]	260[d]	180
	Annual	26[d]	0.74
Methyl isobutyl ketone	30-minute[f]	2,050[d]	4.45
	Annual	205[d]	0.02
Naphthalene	30-minute[f]	440[d]	0.005
	Annual	50[d]	0.0001
[Text deleted.]			
Nitrobenzene	30-minute[f]	24[d]	0.51
	Annual	5[d]	0.002
Phenol	30-minute[f]	154[d]	0.03
	Annual	19[d]	0.0006
Tetrachloroethylene	30-minute[f]	340[d]	17.6
	Annual	34[d]	0.07

Table 3.5.3–1. Comparison of Baseline Ambient Air Concentrations With Most Stringent Applicable Regulations or Guidelines at Pantex Plant, 1993—Continued

Pollutant	Averaging Time	Most Stringent Regulation or Guideline[a] (μg/m³)	Baseline Concentration (μg/m³)
Hazardous and Other Toxic Compounds (continued)			
Toluene	30-minute[f]	1,880[d]	568
	Annual	188[d]	1.73
Trichloroethene	30-minute[f]	[h]	51.1
	Annual	[h]	0.21
Trichloroethylene	30-minute[f]	1350[d]	51.1
	Annual	135[d]	0.21
Triethylamine	30-minute[f]	40[d]	1.08
	Annual	4[d]	0.002
Xylene	30-minute[f]	3,700[d]	145
	Annual	434[d]	0.47

[a] The more stringent of the Federal and State standard is presented if both exist for the averaging time.

[b] Federal and State standard.

[c] Ozone, as a criteria pollutant, is not directly emitted or monitored by the site. See Section 4.1.3 for a discussion of ozone-related issues.

[d] State standard.

[e] Data not available from source document.

[f] 1-hour predicted concentrations were used for the 30-minute standard.

[g] The Texas Natural Resources Conservation Commission does not have an Effects Screening Level (ESL) for the family of alcohols. If ambient levels of air contaminants exceed the screening levels, it does not necessarily indicate a problem. It is just a trigger for a more in-depth review. The most stringent ESL for a single alcohol may be exceeded if applied to the family of alcohols.

[h] No State standard for indicated averaging time.

Source: 40 CFR 50; PX DOE 1996b; TX ACB 1987a; TX NRCC 1992a; TX NRCC 1995a.

3.5.4 WATER RESOURCES

Surface Water. There are no streams or rivers at Pantex, and all site water requirements are met by groundwater. All surface water drains to playas, natural closed depressions that collect runoff to form ephemeral lakes. There are seven playas associated with Pantex. Playas 1 through 3 are located on DOE-owned property, Playas 4 and 5 are on DOE-leased property, Pantex Lake (also a playa) is located approximately 4 km (2.5 mi) northeast of the site boundary, and Pratt Lake is located just north of the site boundary (Figure 3.5.4–1). The only major stream in the area is the Canadian River, which is located approximately 40 km (25 mi) north of Pantex. Since surface runoff at the Plant flows into all playa basins, the Canadian River is not affected by activities at Pantex.

Playas are a significant part of the surface and subsurface hydrologic systems at Pantex. All playas at the site receive stormwater runoff from Pantex vicinity. Playa 1 receives continuous discharges from the Pantex Wastewater Treatment Facility. Steam condensate, noncontact cooling water from buildings, and stormwater runoff are directed to Playas 1, 2, and 4. Playa 3 receives stormwater runoff from the Pantex Burning Ground. Pantex activities have not discharged to Playa 5, but past activities included discharge of treated effluents to Pantex Lake. There are also a number of playas adjacent to Pantex that receive drainage from perimeter portions of the site. Playas provide a source of groundwater recharge, although the rate of recharge is unknown. Studies currently are being conducted to determine this rate.

Because there are no onsite or nearby flowing streams, floodplains exist only in association with the playas. A previous floodplain assessment concluded that the only incidence of flooding would be at some sites including the wastewater treatment plant of Playa 1 and some relict World War II bunkers southwest of Playa 4 (LLNL 1988a:XV). This limited flooding would not affect the operations at Pantex. The 500-year floodplain is also associated with the playas; its boundaries generally follow those of the 100-year floodplain and typically extend only up to several hundred feet beyond the 100-yr boundaries. The exception is Playa 3 where the 500-yr and Standard Project Flood runoff into Playa 3 will overflow out of the drainage basin creating shallow (less than 30 cm [1 ft]) flooding of the drainage basins for Playas 1 and 2. The 100-year floodplain associated with Pratt Lake extends into the far northeast corner of Pantex.

Surface Water Quality. The NPDES program of the CWA is administered by EPA in the State of Texas. In addition, discharge of wastewaters to waters defined as "Waters of the United States" within the State of Texas requires a wastewater discharge permit from the Texas Natural Resources Conservation Commission (TNRCC) in accordance with the Texas Water Code (PX Battelle 1992a:2-12).

In November 1990, Pantex submitted an NPDES permit application for Playas 1, 2, and 4, which is currently under review by Region 6 of EPA. Pantex also submitted an NPDES stormwater discharge permit application in October 1991. The NPDES stormwater permit was issued in February 1995.

The TNRCC allows Pantex to discharge wastewaters into Playas 1 and 2. In December 1990, Pantex filed an application to modify its wastewater discharge permit to allow discharge of both industrial wastewater and rainwater runoff into Playa 4. An application for a renewal of the TNRCC wastewater discharge permit #2296 is on file and is currently under negotiation. Surface water quality sampling results from 1994 confirm that Pantex was in compliance with all discharge water quality regulations for Playa 1. With exception of a high water level in Playa 1 in July 1994, due to a rainfall event, all permit requirements were met (PX DOE 1995d:2-10).

Surface water monitoring is conducted at Playas 1, 2, 3, at the main plant, at Pantex Lake, and at Bushland Playa, an offsite control playa (60 km [37.5 mi] southwest of Pantex) used for comparative purposes. There are some differences in the parameters monitored among the playas, but the results of the 1994 monitoring activities at Playa 1 are presented as representative of the water quality of all the playas at Pantex (Table 3.5.4–1). Bushland Playa contained water in August, September, November, and December in 1994; results were within historical limits.

Table 3.5.4–1. Summary of Playa 1 Surface Water Quality Monitoring at Pantex Plant, 1994

Parameter	Unit of Measure	Water Quality Criteria[a]	Water Body Concentration	
			High	Low
Alpha (gross)	pCi/l	15[b]	7±3	0±4
[Text deleted.]				
Ammonia (as N)	mg/l	NA	1.5	0.095
Arsenic	mg/l	0.05[b,c]	0.01	0.004
Barium	mg/l	2.0[b]	0.3	0.1
Beta (gross)	pCi/l	50[d]	22±4	8±6
[Text deleted.]				
Cadmium	mg/l	0.005[b]	<dL[e]	<dL[e]
Chloride	mg/l	250[f]	270	16
Chromium	mg/l	0.1[b]	0.01	0.003
Copper	mg/l	1.0[f]	0.01	0.005
Cyanide	mg/l	0.2[b]	0.009	0.005
Fluoride	mg/l	2[f],4[b]	2.4	0.48
HMX*	mg/l	NA	<dL[e]	<dL[e]
Iron	mg/l	0.3[f]	11	0.51
Lead	mg/l	0.015[b]	0.005	0.002
Manganese	mg/l	0.05[f]	0.4	0.07
Mercury	mg/l	0.002[b]	0.0002	0.0002
Oil and grease	mg/l	NA	14	0.48
PETN*	mg/l	NA	<dL[e]	<dL[e]
Plutonium-239/240	pCi/l	1.2[g]	0.03±0.01	0±0.03
Radium-226	pCi/l	5.0[b]	0.6±0.4	0.1±0.2
Radium-228	pCi/l	5.0[b]	1.1±0.7	0±0.5
RDX*	mg/l	NA	<dL[e]	<dL[e]
Sulfate (as SO_4)	mg/l	250[f]	80.2	4
TNT*	mg/l	NA	<dL[e]	<dL[e]
Tritium	pCi/l	80,000[g]	0.23±0.21	0±0.15
Uranium-234	pCi/l	20[g]	4.3±0.4	0±0
Uranium-238	pCi/l	24[g]	2.1±0.3	0.1±0.1
Zinc	mg/l	5.0[f]	0.08	0.006

[a] For comparison purposes only.

[b] National Primary Drinking Water Regulations (40 CFR 141).

[c] Texas State water quality criteria. Parameters are considered in exceedance only when their concentrations surpass State water quality criteria. General criteria do not apply to instances in which surface water, as a result of natural phenomena, exhibit characteristics beyond the limits established.

[d] Proposed National Primary Drinking Water Regulations; Radionuclides (56 FR 33050).

[e] All samples were below detection limit. Detection limits varied throughout the year.

[f] National Secondary Drinking Water Regulations (40 CFR 143).

[g] DOE DCG for water (DOE Order 5400.5). DCG values are based on a committed effective dose equivalent of 100 mrem per year; however, because the drinking water maximum contaminant level is based on 4 mrem per year, the number listed is 4 percent of the DCG. All concentrations of radionuclides are determined by subtracting the instrument background environmental level from the monitored concentration. A negative or zero incremental concentration means that the concentration at the sampling location is equivalent to the environmental level.

Note: *=high explosive(s) compounds; NA=not applicable; dL= detection limit.

Source: PX DOE 1995d.

Surface Water Rights and Permits. Water rights in Texas fall under the Doctrine of Prior Appropriations. Under this doctrine, the user who first appropriated water for a beneficial use has priority to use available water supply over a user claiming rights at a later time. Courts also recognize riparian rights legally granted from Spanish-American Agreements. The TNRCC is the administrator for water rights and is the permit-issuing authority.

Groundwater. Pantex is located on the Texas High Plains aquifer system, which is the southernmost extension of a regional aquifer that extends from Texas to South Dakota (PX WDB 1993a:1). The two principal water-bearing units beneath Pantex and adjacent areas are the Ogallala Aquifer and the Dockum Group Aquifer. In addition, perched groundwater occurs locally, particularly under the southeast portion of Pantex, at approximate depths ranging from 64 to 88 m (210 to 290 ft) (PX DOE 1996b:4-65). The occurrence of perched groundwater has been attributed to a fine-grained zone of silty sands and clays that limits the downward movement of groundwater. Perched groundwater collects in buried gravel and sand channel deposits that are on top of the fine-grained zone. Deep wells in the northeast corner of Pantex, completed at depths of 183 to 244 m (600 to 800 ft) into the Ogallala Formation, have provided the water supply at Pantex for over 40 years. In 1994, Pantex reported a total production of 836 million l (221 million gal) of water from onsite production wells (PX DOE 1996b:4-77) and has a capacity to produce 1,900 million l/yr (500 million gal/yr) (PX DOE 1995g:10).

The Ogallala Aquifer beneath Pantex has not been classified by EPA. However, it is the only source of drinking water for Pantex. Depth to water in the Ogallala Aquifer ranges from 104 m (340 ft) at the southern boundary of DOE-leased property at Pantex to 140 m (460 ft) at the northern boundary (PX DOE 1996b:4-57). The saturated thickness of the Ogallala Formation ranges from 15.2 m (50 ft) to more than 120 m (400 ft), and in some areas it is capable of yielding in excess of 4,000 lpm (1,060 gal/min), or 2.1 billion l/yr (554.8 million gal/yr) (PX DOE 1996b:4-69). Estimates of annual recharge rates to the Ogallala Aquifer vary from 0.02 to 4.1 cm/yr (0.01 to 1.6 in/yr) (PX DOE 1996b:4-69, 4-71) based on earlier studies that investigated slow regional infiltration of precipitation and recent studies that explored percolation of water through playa lakes and leakage from the Dockum Group Aquifer into the Ogallala Aquifer (PX WDB 1993a:2).

The withdrawal of water from the Ogallala Aquifer continues to exceed recharge, causing water levels to decline in the Pantex area at a rate of approximately 0.6 to 1.5 m/yr (2 to 5 ft/yr) (PX DOE 1995d:1-9). From 1980 to 1990, the city of Amarillo well field north of Pantex experienced up to 20 m (60 ft) of water-level decline, which may have contributed to a depression in the groundwater surface northeast of Pantex (PX WDB 1993a:11). In 1990, the recoverable volume of water in storage and available for use in the Ogallala Aquifer in the High Plains aquifer system was estimated at 515 trillion l (136 trillion gal) (PX DOE 1996b:4-71). The groundwater flow direction beneath Pantex is to the northeast (PX DOE 1995d:1-8). Figure 3.5.4–2 shows the direction of the groundwater flow in the Ogallala Aquifer beneath Pantex.

An agreement between Pantex and the city of Amarillo is currently being negotiated to develop reclaimed wastewater from the city of Amarillo Hollywood Road Wastewater Treatment Plant. The plant is currently discharging approximately 9,671 million l/yr (2,555 million gal/yr) of the advanced treated wastewater and will be discharging approximately twice that much by 2010. The use of reclaimed wastewater could curtail the annual decline rate of the Ogallala Aquifer.

Groundwater Quality. Pantex's groundwater monitoring program includes monitoring wells distributed throughout the facility and onsite Ogallala production wells. Groundwater samples collected from the monitoring wells that tap the perched and Ogallala aquifers are analyzed for a standard suite of parameters and constituents, including volatile organics, HE, pesticides, herbicides, semivolatile organics, trace metals, radioactive materials (including gross alpha and gross beta measurements), and field parameters (including total dissolved solids and pH).

Historically, only limited metal contamination has been found in some of the wells monitoring the Ogallala Aquifer. Table 3.5.4–2 shows the water quality in the Ogallala Aquifer in 1994. Groundwater samples from the perched zone, however, contain a variety of constituents that are either above background levels or drinking

Table 3.5.4–2. Groundwater Quality Monitoring (Ogallala Aquifer Wells) at Pantex Plant, 1994

Parameter	Unit of Measure	Water Quality Criteria and Standards[a]	Drinking Water Wells		Monitoring Wells	
			High	Low	High	Low
1,2-Dichloroethane	mg/l	0.005[b]	<0.005	<0.005	<0.005	<0.005
Barium	mg/l	2.0[b]	0.16	0.1	0.19	0.12
Chromium	mg/l	0.1[b]	0.007	<0.005	0.007	<0.005
Copper	mg/l	1.0[c]	0.046	<0.005	0.01	<0.005
HMX*	mg/l	NA	<0.020	<0.020	<0.020	<0.020
Iron	mg/l	0.3[c]	0.06	<0.01	1.49	<0.01
Lead	mg/l	0.015[b]	<0.005	<0.005	0.007	<0.005
Nitrate	mg/l	10[b]	1.85	1.37	2.19	0.767
pH	pH units	6.5-8.5[c]	7.7	7	8.1	6.7
RDX*	mg/l	NA	<0.020	<0.020	<0.020	<0.020
Sulfate	mg/l	250[c]	23	21	26	16
Total dissolved solids	mg/l	500[c]	320	240	384	210
Total organic carbon	mg/l	NA	1	<1	2	<1
Total organic halogens	mg/l	NA	5	<1	23	<3
Trichloroethylene	mg/l	0.005[b]	<0.005	<0.005	<0.005	<0.005
Tritium	pCi/l	80,000[d]	0.25	<MDA[e]	0.14	<MDA[e]
Uranium-234	pCi/l	20[d]	4.8	3.7	5.5	0.8
Uranium-238	pCi/l	24[d]	2.8	1.5	2.8	0.9
Zinc	mg/l	5.0[c]	0.18	<0.005	1.9	<0.005

[a] For comparison purposes only.
[b] National Primary Drinking Water Regulations (40 CFR 141).
[c] National Secondary Drinking Water Regulations (40 CFR 143).
[d] DOE DCG for water (DOE Order 5400.5). DCG values are based on 100 mrem per year; however, because the drinking water maximum contaminant level is based on 4 mrem per year, the number listed is 4 percent of the DCG.
[e] Results were less than the Minimum Detectable Activity (MDA).
Note: *=high explosive(s) compounds; NA=not applicable.
Source: PX DOE 1995d.

water standards or are not naturally occurring. These include 1,2-dichloroethane, trichloroethylene, chromium, iron, and the HE RDX and HMX. Table 3.5.4–3 shows the water quality in the perched zone in 1994. Groundwater quality in the perched aquifer has been affected by activities that have occurred over the past 40 years at Pantex. Since the perched aquifer is the shallowest water-bearing zone in the area, it is the first groundwater unit affected by migration of contaminants that were released from past industrial operations. These operations generated HE materials, organic solvents, and metals in liquid and solid waste. The direction and rates of contaminant movement of the perched aquifer are still under investigation, but are expected to be controlled by the location of buried channel deposits, direction and rate of groundwater movement, and source areas of historical contamination. Contaminants are believed to have reached the perched aquifer through historical vertical infiltration from ditches, landfills, and other past localized source areas. Downward migration of perched groundwater could potentially affect the groundwater quality of the underlying Ogallala Aquifer. However, no contamination from HE, organic compounds, or radionuclides has been detected in Ogallala wells onsite (PX DOE 1996b:4-77). In 1995, trace levels (less than 1 part per billion) of RDX were detected in wells tapping the upper portion of the Ogallala east of the plant.

Groundwater Availability, Use, and Rights. Five production wells in the northeast corner of Pantex serve the plant's industrial and potable water needs. During 1994, the plant pumped 836 million l (221 million gal) of

Table 3.5.4–3. Groundwater Quality Monitoring (Perched Zone Wells) at Pantex Plant, 1994

Contaminant	Unit of Measure	Water Quality Criteria and Standards[a]	Water Body Concentration	
			High	Low
1,2-Dichloroethane	mg/l	0.005[b]	0.14	<0.005
Alpha (gross)	pCi/l	15[b]	11	<MDA[c]
Barium	mg/l	2.0[b]	0.25	0.047
Beta (gross)	pCi/l	50[d]	13	<MDA[c]
Chromium	mg/l	0.1[b]	1.95	<0.005
Copper	mg/l	1.0[e]	0.01	<0.005
HMX*	mg/l	NA	0.07	<0.02
Iron	mg/l	0.3[e]	3.55	<0.01
Lead	mg/l	0.015[b]	<0.005	<0.005
Nitrate	mg/l	10[b]	4.8	<0.01
pH	pH units	6.5-8.5[e]	9.0	6.7
RDX*	mg/l	NA	1.1	<0.020
Sulfate	mg/l	250[e]	56	12
Total dissolved solids	mg/l	500[e]	518	160
Total organic carbon	mg/l	NA	15	<1
Total organic halogens	mg/l	NA	259	<1
Trichloroethylene	mg/l	0.005[b]	0.15	<0.005
Tritium	pCi/l	80,000[f]	0.33	<MDA[c]
Uranium-234	pCi/l	20[f]	5.5	0.8
Uranium-238	pCi/l	24[f]	3.0	0.2
Zinc	mg/l	5.0[e]	0.684	<0.005

[a] For comparison purposes only.
[b] National Primary Drinking Water Regulations (40 CFR 141).
[c] Results were less than the MDA.
[d] Proposed National Primary Drinking Water Regulations; Radionuclides (56 FR 33050).
[e] National Secondary Drinking Water Regulations (40 CFR 143).
[f] DOE DCG for water (DOE Order 5400.5). DCG values are based on 100 mrem per year; however, because the drinking water maximum contaminant level is based on 4 mrem per year, the number listed is 4 percent of the DCG.

Note: The following wells were used to determine the contaminant range:
PM-19 (Perched Monitoring Northwest Playa One)
PM-20 (Perched Monitoring Zone 12 Sensor Bed)
PM-38 (Perched Monitoring Northeast Playa One)
PM-44 (Perched Monitoring Building 16-1)
PM-45 (Perched Monitoring Southeast Building 12-2)
PM-106 (Perched Monitoring Northeast Plant)
*=high explosive(s) compounds; NA=not applicable.

Source: PX DOE 1995d.

water from the Ogallala Aquifer, while the city of Amarillo pumped 23.9 billion l (6.3 billion gal) from its Carson County well field located north and northeast of the plant (PX DOE 1996b:4-77). The estimated sustainable groundwater producing capacity of the Ogallala is approximately 2 billion l/yr (0.528 billion gal/yr). Pantex Lake, located adjacent to the Amarillo water-well field, is available for drilling additional water wells if needed for future Pantex operations.

The Ogallala Formation is also a source of municipal and industrial water for nearby towns and cities and for irrigation water to nearby farms. In the Pantex area, the cities of Amarillo and Canyon maintain community water systems (see Figure 2.2.4–1 for regional map). The city of Amarillo draws its raw water from groundwater and Lake Meredith and has the capacity to supply 103,660 million l/yr (27,376 million gal/yr). The city of Canyon maintains the capacity to supply approximately 9,490 million l/yr (2,506 million gal/yr) from its own wells and may purchase up to 6,935 million l/yr (1,831 million gal/yr) from the city of Amarillo.

Groundwater is controlled by the individual landowner in Texas. The TNRCC and the Texas Water Development Board are the two State agencies with major involvement in groundwater fact finding, data gathering, and analysis. Groundwater management is the responsibility of local jurisdictions through Groundwater Management Districts. The Pantex facility is located in Panhandle Groundwater District 3, which has the authority to require permits and limit the quantity of water pumped. Presently, the Panhandle Groundwater District does not limit the quantity of water pumped.

3.5.5 GEOLOGY AND SOILS

Geology. Pantex is located on the Southern High Plains of the Texas Panhandle. The topography at Pantex consists of flat to gently rolling plains. There are no unique geologic landforms, and the only distinctive features are playas that are spaced more or less uniformly throughout the site. The playas are about 500 to 1,000 m (1,640 to 3,280 ft) across, with clay bottoms and depths to approximately 9 m (30 ft).

Pantex is underlain by the Blackwater Draw Formation which consists of a sequence of buried soils with an upper unit consisting of silt, clay, and caliche and a 12- to 23-m (39- to 76-ft thick) lower unit consisting of silty sand with caliche. The Ogallala Formation underlies the Blackwater Draw Formation and consists of interbedded sands, silts, clays, and gravels. The Ogallala Formation is underlain by the sedimentary rocks of the Dockum Group which are underlain by the Upper and Middle permian layers, which are composed predominantly of thick and widespread deposits of salt. The Lower Permian consists predominantly of complex accumulations of shale, limestone and argillaceous limestone, and dolomite. Some Permian formations of the Southern High Plains contain salt beds. The dissolution of these beds have resulted in sinkholes and fractures in nearby Armstrong and Hutchinson Counties, Texas. No sinkholes or fractures have been identified in Carson County. Recent work using shallow seismic data has determined that the structure beneath the playas on Pantex Plant and adjacent areas shows displacement of Ogallala strata. This displacement is attributed to the dissolution of underlying salt beds (PX DOE 1996b:4-31). No economically viable geologic resources have been identified at Pantex.

No capable faults as defined in 10 CFR 100, Appendix A, are present in the vicinity of Pantex. Three major subsurface faults and one minor surface fault occur near the Pantex site area (PX DOE 1995i:2-11). The longest fault, approximately 250 km (155 mi) long, is located about 40 km (25 mi) north of the site. A 70-km (43-mi) long fault is located about 8 km (5 mi) south of the site and a 64-km (40-mi) long fault is located about 11 km (7 mi) north of the site. The minor fault is surficial, about 6 km (4 mi) long, and located about 32 km (20 mi) northwest of the site.

Pantex lies on the boundary zone between Seismic Zones 0 and 1, indicating little or no damage could occur as a result of an earthquake (Figure 3.2.5–1). This area is relatively free from earthquakes. Twenty-five earthquakes with MMIs of VI (Table 3.2.5–1) have been recorded in the Texas Panhandle (PX DOE 1996b:4-33). There is no volcanic hazard at Pantex because there are no known areas of active volcanism in the Texas Panhandle.

Soils. Pantex is underlain by soils of the Pullman-Randall association. The Pullman-Randall soil association consists of nearly level to gently sloping deep noncalcareous clays and clay loams. Pullman soils underlie most of the Pantex area, but Randall soils occur in the vicinity of the playas and depressions. Water and wind erosion and shrink-swell potential are moderate to high for most of the soil units (PX USDA 1962a:2,9-15; PX USDA 1980a:32). However, the soils at Pantex are acceptable for standard construction techniques.

3.5.6 BIOLOGICAL RESOURCES

Terrestrial Resources. Pantex is located within a treeless portion of the High Plains that is classified as mixed prairie. The High Plains vegetational area is a southern extension of the short- and mid-grass prairies of the Western Great Plains. The primary vegetation of the High Plains includes short-grasses (that is, buffalo-grass and blue grama) and mid-grasses (that is, little bluestem, sideoats grama, and western wheatgrass) (PX DOE 1991a:2). Approximately 25 percent of the site, including land leased from Texas Tech University, has been developed (PX 1992a:5). Much of the remainder of the site is currently being managed as native and improved pasture or cultivated by the University or its tenant farmers (PX DOE 1983a:3-20,3-23). Small areas of relatively undisturbed vegetation exist around playas. Some protection for native habitat is also provided where plant operations preclude agricultural activities. Vegetation within these areas is primarily grasses and herbs, although barrel cactus is also present (PX DOE 1995d:5-3,5-4). A site vegetation map is not available (PX 1992a:6). While the area proposed for storage facilities has been largely disturbed by past activities, the assumed analysis site for the evolutionary LWR is in agricultural use. A total of 229 plant species have been identified on the Pantex Site (PX DOE 1993c:2).

Terrestrial wildlife species occurring on Pantex include 7 amphibian, 8 reptile, 43 bird, and 19 mammal species (PX DOE 1994c:4,5; PX DOE 1994d:7-11). Common bird species known to occur in the vicinity of Pantex include the western meadowlark, mourning dove, horned lark, and several species of sparrows. Common species of mammals found in the vicinity of Pantex include the black-tailed jackrabbit, black-tailed prairie dog, and hispid cotton rat (PX 1994a:1; PX DOE 1991a:2). Among the game animals occurring onsite are the desert cottontail, northern bobwhite, scaled quail, mourning dove, and numerous waterfowl species (PX 1994a:1). Hunting is not permitted at Pantex (PX 1992a:5). Common raptors on Pantex include the Swainson hawk, American kestrel, and burrowing owl (PX DOE 1994b:3,5). Carnivores present include the badger and coyote. A variety of migratory birds has been found at Pantex. Migratory birds, as well as their nests and eggs are protected by the *Migratory Bird Treaty Act*. Eagles are similarly protected by the *Bald and Golden Eagle Protection Act*.

Wetlands. Wetlands at Pantex are associated with the five playa basins occurring on the site, and Pantex Lake (also a playa), located approximately 5 km (3 mi) northeast of the site. The NWI map identifies Playas 1 through 5 and part of Pantex Lake as wetlands. Playas 1, 2, and 3 are classified by the USFWS as palustrine systems. The larger Playas, 4 and 5, and most of Pantex Lake are classified as lacustrine systems. Playas 1, 2, and 4 currently receive stormwater discharge. There are numerous smaller wetlands (approximately 4 ha [10 acres] or less) located on western and southwestern parts of Pantex in areas that are largely grazed or farmed (PX 1992a:4). While these wetlands have not been delineated using COE criteria (USCOE 1987a:13-14), they are classified on NWI maps as palustrine systems. Situated along the central flyway migratory route, the Pantex playas are important to migratory birds and also provide valuable habitat for nesting and wintering species. While the consolidated Pu storage facility site does not contain any of the smaller wetlands noted above, the assumed analysis site for the evolutionary LWR could contain one such wetland.

Aquatic Resources. Aquatic habitat at Pantex is limited to five ephemeral playas (including Pantex Lake), one permanent playa, and several ponds and ditches. Although the playas and ditches may provide habitat for amphibians and macroinvertebrates, they do not support any fish populations (PX 1992a:5), except for a small pond at the southeast corner of Pantex Lake, which supports a population of minnows (PX DOE 1996b:4-139). Aquatic resources do not occur on the consolidated Pu storage facility site or the assumed analysis site for the evolutionary LWR.

Threatened and Endangered Species. Ten federally or State-listed threatened, endangered, and other special status species may be found on or in the vicinity of Pantex; eight of these are federally or State-listed as threatened or endangered (Table 3.5.6–1). Five species listed in Table 3.5.6–1 have been observed on Pantex, including four of the federally or State-listed threatened or endangered species. Once specific project locations have been determined, site surveys will verify the presence of special status species. The discussion presented

Table 3.5.6–1. Federally and State-Listed Threatened, Endangered, and Other Special Status Species That May Be Found on or in the Vicinity of Pantex Plant

Common Name	Scientific Name	Status[a] Federal	Status[a] State
Mammals			
[Text deleted.]			
Swift fox[b]	*Vulpes velox*	C	NL
[Text deleted.]			
Birds			
American peregrine falcon[c]	*Falco peregrinus anatum*	E	E
Arctic peregrine falcon	*Falco peregrinus tundrius*	E (S/A)	T
Bald eagle[b,c]	*Haliaeetus leucocephalus*	T	E
[Text deleted.]			
Interior least tern[c]	*Sterna antillarum athalassos*	E	E
[Text deleted.]			
Mountain plover	*Charadrius montanus*	C	NL
[Text deleted.]			
White-faced ibis[b]	*Plegadis chihi*	NL	T
Whooping crane[b,c]	*Grus americana*	E	E
Reptiles			
Smooth green snake	*Opheodrys vernalis*	NL	E
[Text deleted.]			
Texas horned lizard[b]	*Phrynosoma cornutum*	NL	T

[a] Status codes: C=Federal candidate; E=endangered; NL=not listed; S/A=protected under the similarity of appearance provision of the ESA; T=threatened.

[b] Species observed on the Pantex Plant site.

[c] USFWS Recovery Plan exists for this species.

Source: 50 CFR 17.11; 50 CFR 17.12; 61 FR 7596; PX DOE 1996b; PX MH 1994c; TX PWD 1993a; TX PWD 1995a; TX PWD 1995b.

in this section is generally applicable to Pantex as a whole. No critical habitat for threatened and endangered species, as defined in the ESA (50 CFR 17.11; 50 CFR 17.12), exists on Pantex.

The bald eagle is a winter resident that has been observed foraging at playas on the site each year. Prairie dog towns provide feeding habitat for bald eagles and other raptors. The whooping crane, an infrequent migrant in the Texas Panhandle, was observed foraging onsite and in the surrounding area in the fall of 1990 (PX 1992a:3). Migratory peregrine falcons (undetermined subspecies) have been observed hunting shorebirds and waterfowl near area playas (PX WTS 1992a:1). [Text deleted.] Possible swift fox dens have been found on Pantex. The Texas horned lizard is known to reside on the site. [Text deleted.] White-faced ibis forage at the playas.

There is little undisturbed habitat at Pantex that would accommodate any of the threatened, endangered, and other special status species, other than the Texas horned lizard, listed in Table 3.5.6–1. Most of these species are attracted to the playas, which provide water and foraging habitat. No federally or State-listed plant species are known to occur on Pantex. However, there are three cactus species at Pantex that may be proposed for a watchlist of potentially threatened plant species (PX DOE 1993c:15-16).

3.5.7 CULTURAL AND PALEONTOLOGICAL RESOURCES

Prehistoric Resources. Prehistoric site types identified at Pantex include small temporary campsites and limited activity locations characterized by surface scatters of artifacts. Archaeological surveys at Pantex have systematically covered approximately one-half of the facility. Approximately 60 prehistoric sites have been recorded to date on DOE and Texas Tech University property. Some of the sites contain heat-altered rock and artifact types that suggests food processing. These prehistoric campsites tend to be clustered near the Pantex playa drainages. Of 23 archaeological sites tested, only one has been determined potentially eligible for listing on the NRHP. It is a late prehistoric bison kill or butchering site north of Pantex Lake. Some areas where the facilities would be located have not been systematically surveyed for prehistoric resources. However, a site location model has been developed and tested at Pantex, and indicates it is highly unlikely that such sites are present. In this model, prehistoric sites would be located only within 0.4 km (0.25 mi) of playas or their obvious drainages. A Programmatic Agreement to ensure regulatory compliance at Pantex will be in place by fiscal year 1997, and a cultural resource management plan is being developed. Implementation of this plan, which will supersede the Programmatic Agreement, is scheduled for 1998. An interim programmatic agreement is in place to ensure regulatory compliance, and potential impacts are evaluated on a case-by-case basis.

Historic Resources. The Pantex facility was originally constructed in 1942 as a World War II bomb-loading plant on land claimed from local farmers. To date, 12 historic archaeological sites associated with these original farmsteads have been located and recorded. These sites have minimal integrity and are highly unlikely to be eligible for the NRHP. All of Pantex has been surveyed for World War II-era structures and foundations, and all such properties have been systematically recorded. Based on information gathered during surveys, Zone 4, originally constructed as a High Explosive Storage Area for ammonium nitrate, does not appear to possess the architectural integrity necessary to be eligible for the NRHP. The Texas SHPO prepared a list of 45 buildings in Zones 11 and 12 that may be eligible for NRHP listing. The Cold War historic context has not yet been fully defined for Pantex. When completed, it is probable that a number of plant structures will be determined NRHP eligible.

Native American Resources. Native Americans known to have potential interests in Pantex include the Comanche Tribe of Oklahoma; the Kiowa Tribe of Oklahoma; the Apache Tribe of Oklahoma; the Cheyenne-Arapaho Tribe of Oklahoma; the Wichita and Affiliated Tribes; the Caddo Tribe of Oklahoma; the Delaware Tribe of Western Oklahoma; and the Fort Sill Apache Tribe. Four of these tribes, the Fort Sill Apache Tribe, the Apache Tribe of Oklahoma, the Kiowa Tribe of Oklahoma, and the Comanche Tribe of Oklahoma, have recognized traditional interests in Pantex. DOE is performing a historic treaties search and a public outreach program to involve Native American stakeholders in decisionmaking related to the use of Pantex land and the protection of cultural resources. Traditional cultural properties have not been identified at Pantex, but the remains of temporary historic campsites and hunting locations are possible.

Paleontological Resources. The surficial geology of the Pantex area consists of silts, clays, and sands of the Blackwater Draw Formation. In other areas of the High Plains, this formation contains Late Pleistocene vertebrate remains, including bison, camel, horse, mammoth, and mastodon, with occasional evidence of their use by humans. [Text deleted.]

3.5.8 SOCIOECONOMICS

Socioeconomic characteristics described for Pantex include employment, regional economy, population, housing, community services, and local transportation. Statistics for employment and regional economy are presented for the REA, which encompasses 32 counties surrounding Pantex in Texas and New Mexico (Table L.1–1). Statistics for population, housing, community services, and local transportation are presented for the ROI, a four-county area in which 95.8 percent of all Pantex employees reside: Armstrong County (1.4 percent), Carson County (5.4 percent), Potter County (34.4 percent), and Randall County (54.6 percent) (Table L.1–5). In 1994, Pantex employed 3,559 persons (1.8 percent of the total REA employment).

Regional Economy Characteristics. Selected employment and regional economy statistics for the Pantex REA are summarized in Figure 3.5.8–1. Between 1980 and 1990, the civilian labor force increased 9.3 percent to 209,786. In 1994, the unemployment rate in the REA was 4.8 percent, lower than 6.4 percent unemployment in Texas and 6.3 percent unemployment in New Mexico. The 1993 per capita income in the REA was $19,312, higher than the per capita income in both Texas ($19,145) and New Mexico ($16,346).

Employment patterns in the REA closely parallel those in Texas and New Mexico, with manufacturing, retail trade, and service providing the majority jobs. The service sector accounts for the largest percentage of employment in both Texas and New Mexico, 27.7 percent and 28.3 percent, respectively, as well as in the region, 22.1 percent.

Population and Housing. Population and housing trends in the Pantex ROI are summarized in Figure 3.5.8–2. The ROI population, which totaled 205,684 in 1994, grew 12.8 percent between 1980 and 1994, less than half the growth rate of Texas (29.2 percent) during the same period. Within the ROI, the population of Carson County fell by 1.5 percent, while Randall County's grew 25.4 percent.

The increase in the total number of housing units in the ROI between 1980 and 1990 was approximately 11 percent, less than half the 26.3-percent increase in Texas. In Randall County, however, the number of housing units increased 28.3 percent during the same period. In 1990, homeowner and rental vacancy rates in the Pantex ROI were similar to those in Texas, approximately 3 percent and 14 percent, respectively.

Community Services. Community services described for the Pantex ROI are education, public safety, and health care. Figure 3.5.8–3 presents school district characteristics for the Pantex ROI, and Figure 3.5.8–4 presents public safety and health care characteristics.

Education. In 1994, the nine school districts that provided public education services and facilities in the Pantex ROI ranged in enrollment size from 229 students in the Groom School District to 28,925 students in the Amarillo School District. As shown in Figure 3.5.8–3, school districts were operating between 63.5 and 99.7 percent of capacity. The average student-to-teacher ratio for the ROI was 16.3:1.

Public Safety. Six city and county law enforcement agencies provide police protection in the ROI. In 1994, the city of Amarillo maintained the largest police force in the ROI, with 253 officers. The average ROI officer-to-population ratio was 2.3 officers per 1,000 persons. Figure 3.5.8–4 displays the sworn police officer-to-population ratios for the ROI counties and cities.

Ten fire departments consisting of a total of 491 regular and volunteer firefighters provided fire protection services in 1995. The city of Amarillo had the largest department in the ROI, with 213 paid firefighters. The highest firefighter-to-population ratio was 19.0 firefighters per 1,000 persons in Armstrong County. The average ROI firefighter-to-population ratio was 2.3 firefighter per 1,000 persons.

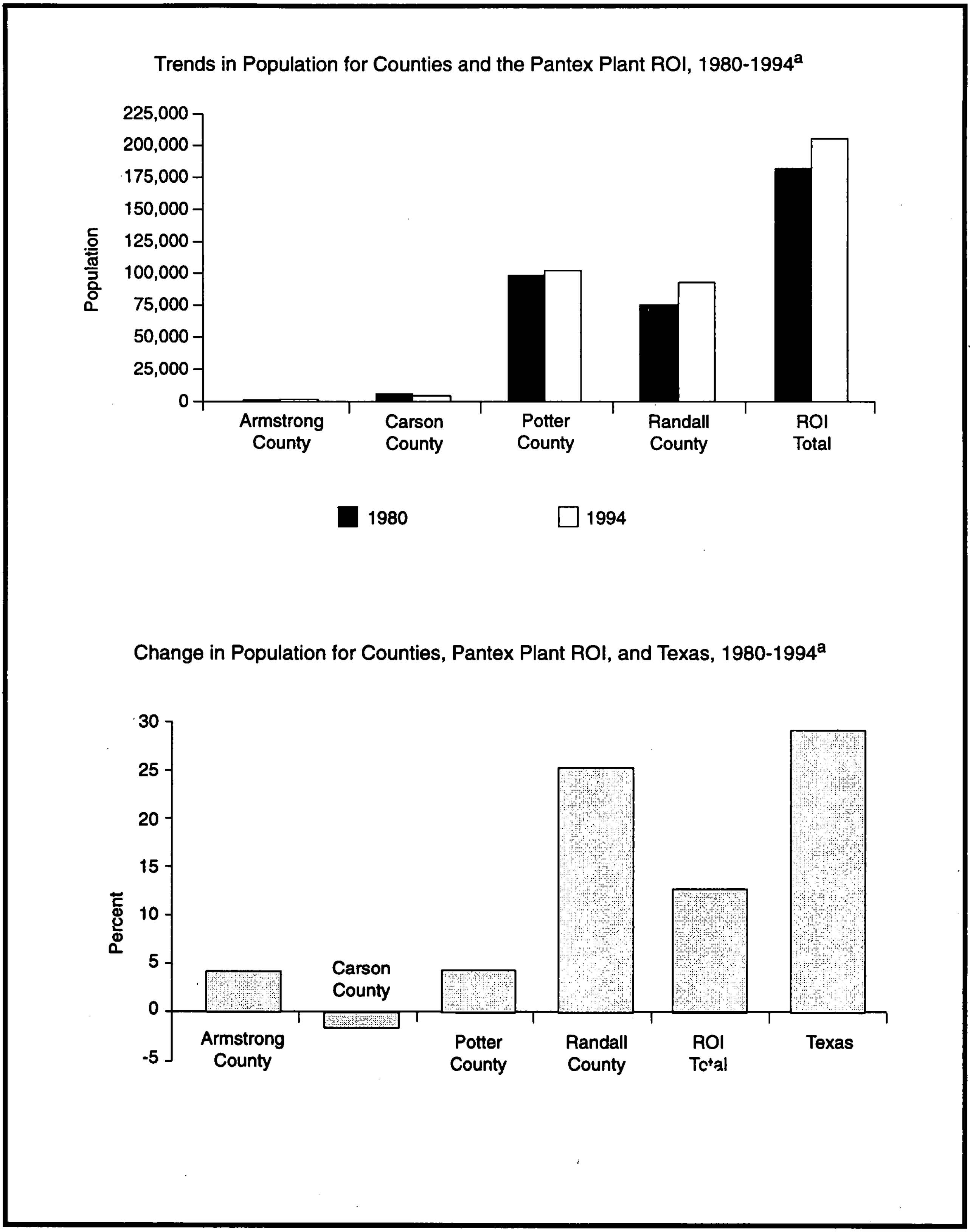
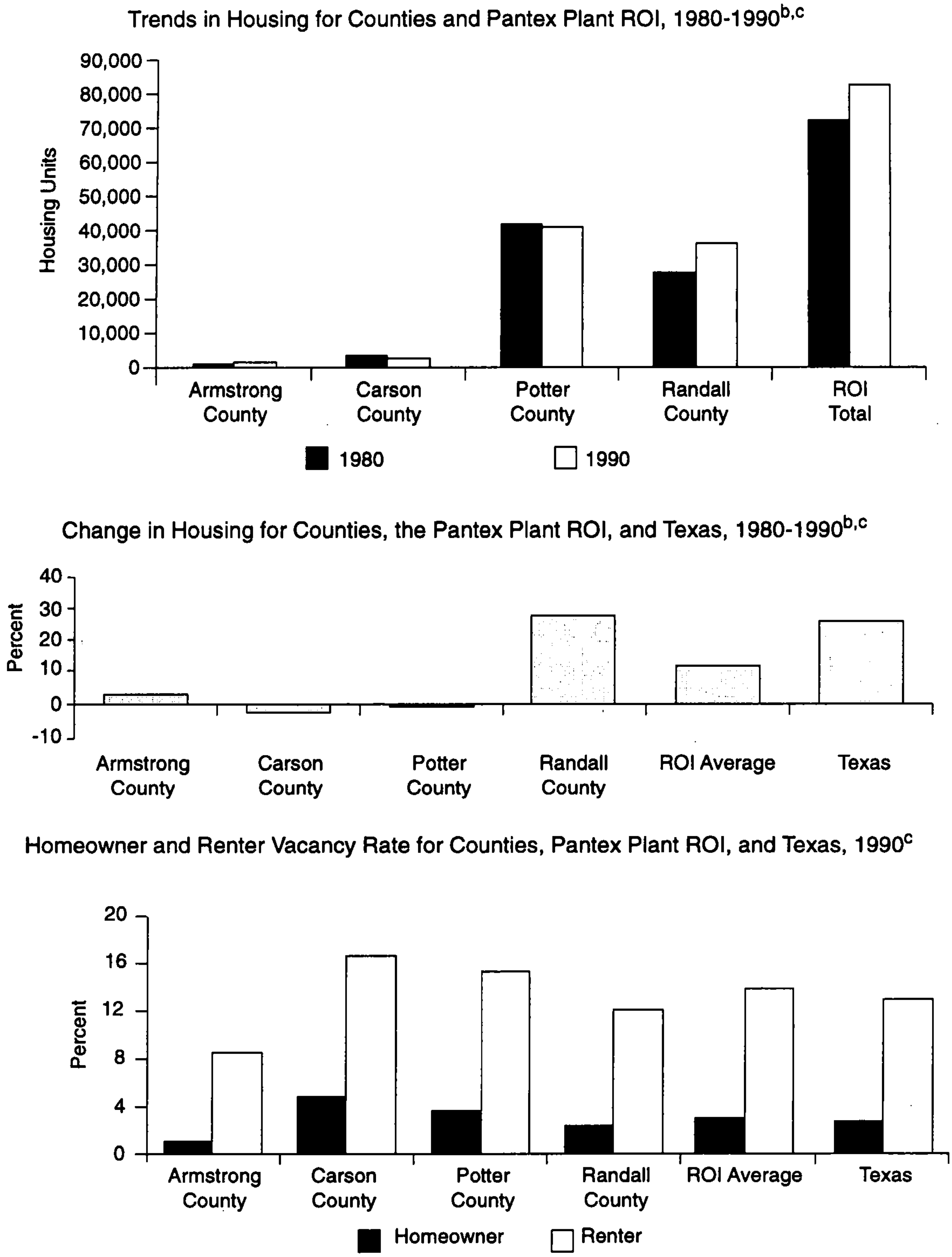
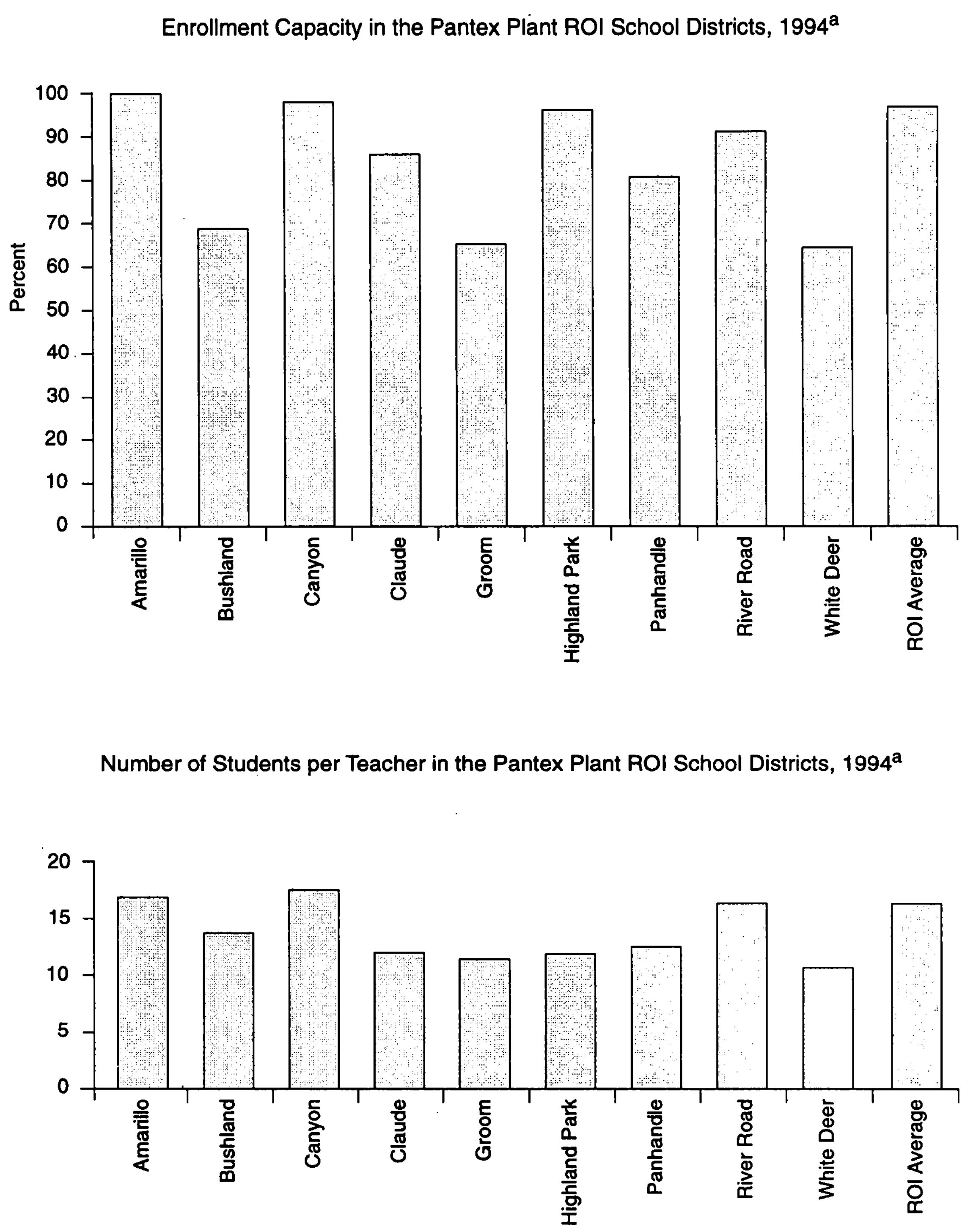


Figure 3.5.8–2. Population and Housing for the Pantex Plant Region of Influence and the State of Texas.



[a] Census 1994o; Census 1995a
[b] Census 1982a.
[c] Census 1991m.

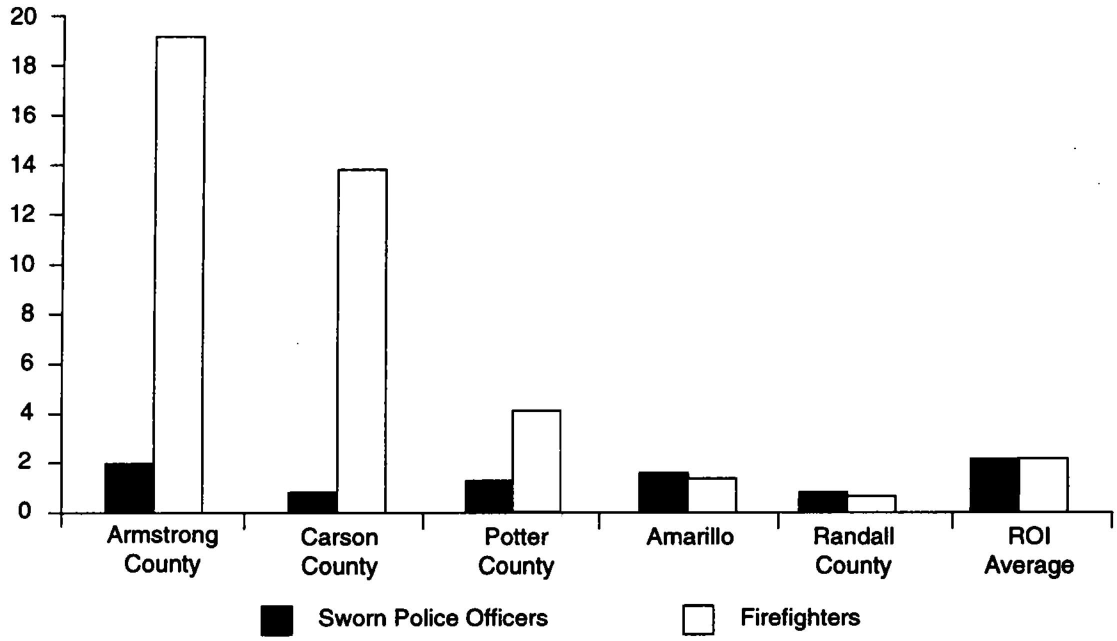
Figure 3.5.8–2. Population and Housing for the Pantex Plant Region of Influence and the State of Texas—Continued.



[a]Socio 1996a.

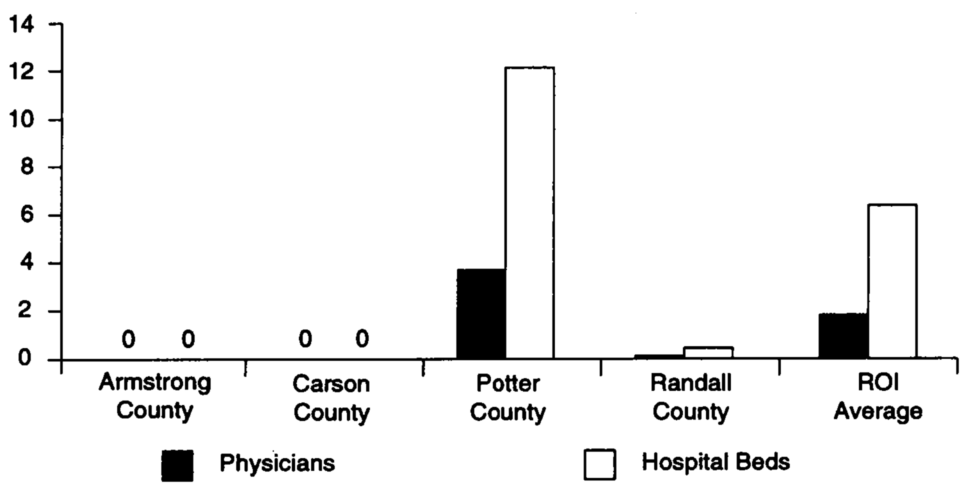
Figure 3.5.8–3. School District Characteristics for the Pantex Plant Region of Influence.

Number of Sworn Police Officers (1994) and Firefighters (1995) per 1,000 Persons in the Pantex Plant ROI[a]



Note: Non-ROI city values are included in county totals. Amarillo police and firefighters serve both Potter and Randall Counties.

Number of Physicians and Hospital Beds per 1,000 Persons in the Pantex Plant ROI, 1994[b]



[a] Census 1995a; DOC 1996a; DOC 1996b; DOJ 1995a; Socio 1996a.
[b] AHA 1995a; AMA 1995a; Census 1995a.

Figure 3.5.8–4. Public Safety and Health Care Characteristics for the Pantex Plant Region of Influence.

Health Care. Six hospitals serve the four-county ROI, all operating well below capacity. The highest hospital bed-to-population ratio was 12.3 beds per 1,000 persons in Potter County. There are no hospitals in Armstrong or Carson Counties; medical emergencies in these counties are customarily transported to the cities of Amarillo or Pampa via ambulance service. In 1994, a total of 407 physicians served the ROI. Figure 3.5.8–4 shows that the highest physician-to-population ratio was 3.8 physicians per 1,000 persons in Potter County while there were no physicians in Carson and Armstrong Counties. The average physician-to-population ratio in the ROI was 2.0 physicians per 1,000 persons.

Local Transportation. Vehicular access to Pantex is provided by Farm-to-Market Roads 683 to the west and 2373 to the east. Both roads connect with Farm-to-Market Road 293 to the north and U.S. Highway 60 to the south. No major improvements are scheduled or currently ongoing for roads providing immediate access to Pantex (see Figure 2.2.4-1 and Figure 2.2.4-2).

Four road segments in the ROI could be affected by the storage and disposition alternatives. The first is I-27 from Local Route 335 at Amarillo to I-40 at Amarillo. This segment operated at level of service A in 1995. The second is Farm-to-Market Route 683 from U.S. 60 to Farm-to-Market Route 293. This segment operated at level of service A in 1995. The third is Farm-to-Market Route 2373 from I-40 to U.S. 60. This segment operated at level of service A in 1995. The fourth is Farm-to-Market Route 2373 from U.S. 60 to Farm-to-Market Route U.S. 60. The segment operated at level of service A in 1995.

Amarillo City Transit provides public transport service to Amarillo, but the service does not extend to Pantex. The major railroad in the Pantex ROI is the Burlington Northern and Santa Fe Railroad, a mainline which forms the southern boundary of Pantex and provides direct access to the site. There are no navigable waterways within the ROI capable of accommodating material transports to the plant.

Amarillo International Airport provides jet air passenger and cargo service from national and local carriers. Several smaller private airports are located throughout the ROI.